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Determining the influence on technology integration by the problem solving styles of instructors of history, classics and humanities courses

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Determining the Influence on Technology Integration by the Problem Solving Styles of Instructors of History, Classics and Humanities Courses.

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Abstract

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More is spent on a single B-2 bomber than the combined annual budgets of the National Endowments for the Arts, the Humanities, and the Corporation for Public Broadcasting. History, classical, humanities studies instructors are traditionally the last to receive instruction on integrating technology in their fields. The purpose of this study was to investigate how history, humanities and classical studies instructors at a mid-Atlantic university used a web-page designed to supplement and/or support their traditional classroom instruction. This study looked at how individual problem solving styles of instructors influenced the level at which they integrated new Internet technologies in their instruction. Data was collected using an instrument based on Rieber and Welliver's hierarchy of technology integration and from interviews conducted during the semester of instruction. It was found that an instructor's assessment of his/her problem solving style could influence the level at which he or she integrated technology.

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Chapter 1

Introduction

The Internet has literally invaded every aspect of society. More and more demands are being placed on instructors at all levels and in all content areas to integrate the internet's vast resources. Many instructors in more classical or social studies oriented content areas have had little experience in using new technologies let alone integrating Internet resources in their instruction.

At the same time, instructional technology is still a fairly new discipline whose origins are usually found in math and computer science. Although professional development sessions are available, few focus on the special needs of instructors of classical studies or humanities. This is at a time when the combined annual budgets of the National Endowments for the Arts, the National Endowment for the Humanities, and the Corporation for Public Broadcasting still does not equal the cost of one B-2 bomber (Walls, 1995).

The Internet has the potential of providing free and low cost resources for those content areas that tend to be rooted in traditional classroom teaching methods. Internet technology can be used to enhance instruction if an instructor is willing to try new strategies.

Statement of the Problem

The problem then is to determine if technology integration is influenced by the problem solving styles of instructors of history, classics and humanities courses. For this study, Internet technologies will be defined to include web pages designed specifically for use with instruction and other available resources (i.e. web board, chat rooms, graphics, sound, and textual information) found on the Internet. Also in this study when referring to the level of technology integration, it shall be defined as the level of integration with respect to Internet technologies.

I have chosen to use a case study approach that uses both quantitative and qualitative data sources. The quantitative data will provide a general analysis for each teacher that will be compared with the qualitative data to provide a better overall picture of how the instructor's

teaching style has changed with the level of technology integration. While the quantitative data will focus on the individual instructor's problem solving style and level of technology integration, it will not necessarily include how the instructor's teaching style has changed. There will also be gaps as to why the instructor's teaching has change. Qualitative data collected through interviews will not be as narrow and will allow for individual reflection. Through open-ended questions, the instructor will have time to reflect and think more carefully to respond with greater depth. The following are the research questions being considered:

1. What influence does using a web page designed to support and/or supplement a course have on these instructor's ability to integrate technology?
2. What relationship exists between these instructors' styles of problem solving have on his or her ability to integrate technology?

Chapter 2

Literature Review

Technology Integration

The initial failure of computer technologies in education was credited to the instructors' inability to adapt these new technologies to his or her teaching style (Cuban, 1986). There has been research to suggest that there is a tendency for instructors to stay with instructional strategies with which they are already familiar and comfortable (Tobin & Dawson, 1992).

In discussing how technology can be effectively used and integrated into instruction, Rieber and Welliver (1989) have suggested a hierarchical process that instructors must go through consisting of five steps: (1) familiarization, (2) utilization, (3) integration, (4) reorientation, and (5) evolution. In the first stage, familiarization, an instructor is just becoming aware of some of the uses of Internet technology, not necessarily for instructional purposes (Rieber & Welliver, 1989). Instructors may use email to correspond with other professionals or to conduct research pertinent to their own interest.

In the next stage, utilization, instructors are actually beginning to make use of the Internet to support their instruction. A web-page may act as an online syllabus with reference links to support activities done in class. It is at this stage the instructor may also return to more traditional instructional methods if a problem should arise. This is because the online syllabus or references links are not essential and can easily be replaced with textbooks.

The integration stage is the turning point where the technology becomes essential to the learning process (Rieber & Welliver, 1989). At this stage, the Internet is no longer considered a mere "add-on" and is an integral part of instruction. Activities that cannot be done within the confines of a classroom, such as a virtual museum trip, now depend on the Internet to provide

such activities. The links are no longer mere references links, but links to the outside world. Unfortunately, this is also the final stage for many teachers, instead of being only the beginning of understanding the role of technology in education.

At the reorientation stage, the instructor begins to redefine his or her role as a professional with respect to the students (Rieber & Welliver, 1989). Traditional classroom instruction is now replaced with a form of distance education or web-based instruction. Using chat rooms and web boards, the instructor takes on the role of facilitator and allows the student to take on more responsibilities in the learning process. Students are encourage to bring in new information found on the Internet to share with other students and the instructor. Students will begin to post assignments online in the form of student web-pages.

The final stage of this process is called evolution and is an ongoing one. Teachers become more of administrators of technology as they now begin to evaluate new Internet resources and the new skills required to use the Internet for their students and other teachers (Rieber & Welliver, 1989).

The level of integration of any new technology with the traditional classroom has been found to be dependent on whether it is considered an integral part of instruction and not just another addendum. In a study done by Hu and Nelson (1997) with inservice teachers, there was a significant change in the teachers' technology integration at the integration stage, which indicated that the technology had become an indispensable tool for the teachers to fulfill their instructional goals.

New technologies such as the Internet not only challenge the way an instructor teaches, but also the role an instructor takes in the instructional process (Barnard, 1997). The traditional role of an instructor does not change much when the Internet is used for email messages and

archival purposes. However, the Internet can suddenly become an international instructional environment where the teacher now becomes a facilitator who is merely monitoring student-center activities (Hannafin & Savenye, 1993). While this new role can be very challenging for the student, it can also be very threatening and overwhelming for the instructor.

Problem Solving Inventory

While there are some that sing the praises of technology, technology does not always make life easier for instructors. In reality, technology can only complicate it further. For some instructors, the problem of adapting new instructional strategies that integrate technology will focus on classroom management and student behaviors. The problem resulting from the pressure society puts on an instructor to be in total control of the classroom is reason enough not to integrate the new technology.

There have been studies that suggest that an instructor's ability to problem solve can influence the way in which that instructor will integrate technology into his or her instruction (Heppner, 1997). An instructor's own beliefs in the way that she or he is able to cope with instructional problems may be related to the level at which a new technology is integrated into his or her instructional methods. In a study by Nelson (1998), there was evidence to suggest that there was an intrinsic relationship between an instructor's ability to problem solve and an instructor's ability to integrate technology. Research further suggests that a teacher who has doubts about his or her ability to solve a problem will be more likely give up on using the technology when faced with a problem arising from using the new technology (Bandura & Cervone, 1983). Research has further suggested that teachers with high self-efficacies will be more likely to use the technology than those with low self-efficacies (Delcourt & Kinzie, 1993).

Instructional Web Pages

Web pages can basically be used three ways for regular instruction: support, supplement, and supplant. Supportive web pages are exactly that; they support regular classroom instruction by acting as archives for course-related information (Cravener, 1998). In this case, an instructor will create a web page that in essence duplicates the handouts such as the syllabus, review sheets, or study questions. The purpose of this web site is for appearance or students needing additional copies of what has already been handed out in class.

Web pages that supplement regular classroom instruction can provide experiences and out-of-class web interactions such as electronic field trips or Internet laboratory exercises. Here the instructor will include resource links to supplement what is being taught in the regular classroom. Outside assignments that focus on these online resources may be required or the instructor may also use the resource links in class to demonstrate an idea or to present additional information.

When web-based instruction supplants regular classroom instruction, it is a form of distance education where all the interaction, learning, and instruction takes place online. The instruction can be in the form of synchronous or real-time instruction where the instructor meets online in a chat room with the class, or asynchronous where the instructor uses a web board to post discussion questions or messages for the class. While synchronous instruction can be modeled after the more familiar traditional classroom instruction with regular meeting times, asynchronous instruction allows for students to log on any time day or night and work independently.

Chapter 3

Design of Study

Purpose of Study

The purpose of this study was to investigate how history, humanities and classical studies instructors used a web-page designed to supplement and/or support their traditional classroom instruction. The research questions for this study were: (1.) What influence does using a web-page designed to support and/or supplement a course have on these instructor's ability to integrate technology; and (2.) What relationship exists between these instructors' styles of problem solving have on his or her ability to integrate technology?

Design of Study

This study was conducted over the course of a five-month period with history, humanities, and classical studies instructors who teach undergraduate course at a university. A web site was created for each course by the researcher in collaboration with each instructor. The researcher met regularly with each instructor during the summer month prior to the semester that the courses were offered to ensure that the instructional goals were met. During the semester, the researcher continued to monitor the web sites to maintain that all links were current or to update the sites as required by the instructor. If asked by the instructor, the researcher conducted Internet searches to find additional resources and links.

A case study approach was used that incorporated both quantitative and qualitative data. While each case study focused on individual instructors, a general analysis using the quantitative study looked for inferences that could be drawn from this group of instructors as a whole.

Sample

The sample consisted of three university professors, two female and one male who teach at a mid-Atlantic state university. Because all three expressed a desire to be able to integrate

some form of Internet technology with their courses, they were selected for this research proposal. The two female instructors taught undergraduate humanities and classical studies courses that were used with this project. Each of these instructors had a limited background in using technology with their instruction. The one male instructor taught an undergraduate history course and had some prior experience with using technology with his instruction.

Independent Variables

Problem Solving Inventory. In the Problem Solving Inventory (PSI), problem solving is equated with coping (Heppner, 1988). The PSI assesses an individual's awareness of his or her own problem-solving abilities or style versus actual problem-solving skills based on three scales: problem-solving confidence, approach-avoidance style, and personal control. These three factors are considered to be independent enough to be treated as separate scales though inter-scale correlations performed have suggested moderate correlations between the factors (Confidence, r = .49; Approach-Avoidance, r = .49 and Personal Control, r = .38).

Problem-solving confidence is how much an individual will trust in his or her own ability to solve a problem. In essence, it is a measure of a learner's self-assurance when solving a problem. An example of a statement is "When I make plans to solve a problem, I am almost certain that I can make them work."

Approach-avoidance style is where an individual has a tendency to either approach the problem or avoid it depending on how effective the individual judges his or her abilities (Heppner & Baker, 1997). Those who tend to avoid problems will dwell on their own inefficiencies while those who have high self-efficacies will approach a problem and be more likely to follow through with new ideas. An example item is "When confronted with a problem, I consistently examine my feelings to find out what is going on in a problem situation."

Personal Control style is how much an individual believes that he or she is in control of his or her emotions and actions when problem solving. Low scores on the PSI suggest more positive appraisals of their problem-solving abilities (Heppner, 1988). A higher score in this style suggests that the individual will react to a problem more on an intuitive level versus using analytical thinking. An example of this is "I make snap judgments and later regret them."

This instrument is a 35-item instrument that uses a 6-point Likert scale. This is a personal assessment and was administered prior to the fall semester.

Dependent Measures

Technology Integration Survey. This instrument was co-authored by Dr. Paula Nelson and Dr. Jun Hu and has shown to have a reliability of .88 in earlier studies. The instrument consists of 20 items using a 4-point Likert scale. It is designed to determine the teacher's level of technology integration based on the technology integration hierarchy as describe by Rieber and Welliver (1989). The instrument was administered prior to the course being taught and again at the end.

Other Data Sources

Instructor Interview. Three interviews were conducted to determine: (1.) what kind of instructional activities were used to integrate the web-page by the instructor; (2.) how using a web-page in instruction influenced the instructor's teaching style; and (3.) what role an instructor's problem solving style played when integrating technology.

Interviews were taped and then later transcribed. Data was then coded and studied for categories to develop into themes. The following table was used as guidelines when studying the data.

Table 1

Guidelines for Deciding the Level of Technology Integration for the Web Site and How Using the Web Site Affects an Instructor's Teaching Style

Level of Technology Integration	Internet Use	Role of the Instructor
Familiarization	Internet is solely used for the instructor's purposes: email or personal research	Lecturer, sole provider of information
Utilization	A web-site is created for support, mostly archival purposes: Online syllabus with reference links	Lecturer, sole provide of information
Integration	Web-site is supplemental; electronic field trips, Internet laboratory exercises and research. The instructor provides an outline and a list of sites for students to explore.	The web site now provides much of the text and classroom experiences though the instructor has predetermined much of this.
Reorientation	Web-site supplants regular classroom instruction in a form of distance education where students meet in online chat sessions for class or post comments at a webboard. Students are encouraged to seek out additional information.	Role of the instructor changes to facilitator and the students become more active in how and what they learn.
Evolution	Instructors provide instruction on web-page construction in order that student work can be in the form of a web-site.	The instructor becomes an administrator of technology.

The first interview was conducted while working with each instructor to design a web site for use with his or her course. The second interview was conducted at mid-semester to determine if any changes in the instructor's style of teaching had occurred. The third interview was conducted at the end of the course to determine if there were any further changes in the instructor's level of technology integration.

Chapter 4

Analysis

Individual case studies were performed on each of the teachers to answer the following research questions: (1.) What influence does using a web-page designed to supplement and/or support a course have on these instructor's ability to integrate technology; and (2.) What relationship exists between these instructors' styles of problem solving have on his or her ability to integrate technology? Since each instructor was unique in regard to classes being taught and the amount of technology available, individual case studies that combined both qualitative data and quantitative data were used to answer these research questions. Qualitative data were collected from email messages, web page updates from the instructors, and pre and post interviews with each instructor, which were analyzed and studied for common themes. Then the qualitative data was compared with the quantitative data, which included an overall technology integration (TI) score and a Problem Solving Inventory (PSI) score for that teacher.

Problem Solving Inventory

The Problem Solving Inventory (PSI) is a personal assessment of an individual's awareness of how he or she problem solves. The instrument is based on the underlying principle that there are at least three dimensions to the problem-solving process: Problem-Solving Confidence (to be referred to as Confidence), Approach-Avoidance style, and Personal Control. Scores in problem solving confidence are indicators of an individual's trust in his or her ability to solve problems. Scores regarding approach-avoidance style are indicators as to whether an individual will tend to approach a problem or avoid it. The last style, personal control, is an indicator of the extent to which an individual feels he or she is in control when problem solving. An overall low total PSI score (which would include all three scores) indicates that the individual

has high confidence in his or her ability to problem solve, is more likely to approach a problem, and has a great level of personal control over emotions and behaviors when problem solving.

Table 2

Problem Solving Inventory Scores

Teacher (Range)	Confidence (11-66)	Approach-Avoidance (16-96)	Personal Control (5-30)	Total PSI (all factors) (32-192)	Grouping
Taylor	36	45	15	96	High
Winter	24	39	20	83	Medium
Allen	24	31	10	65	Low

Using all three factors for the each member in the sample, a mean of 81.33 was found for the total PSI scores with a standard deviation of 15.5. Using this information, instructors were assigned to a level created using the mean and standard deviation. One instructor's total PSI score was just about one standard deviation above the mean and was labeled High and one instructor's total PSI score was just one standard deviation below the mean and was labeled Low (see Table 2). The instructor at the in-between was labeled Medium. It should be noted that the high and low instructors scored low in Personal Control indicating that these instructors felt they are very much in control of their behaviors and emotions when problem solving. The third instructor scored at the midway point in the Personal Control indicating that this instructor felt she was somewhat in control of her behaviors and emotions when problem solving. The Personal Control factor can also be an indication as to the amount of perceived control over one's environment when problem solving. In that case, the lower scores would indicate that the

instructors feel they are very much in control of their environment when problem solving.

One instructor had the highest scores in Confidence and Approach-Avoidance which may suggest that this instructor has less trust in his ability to problem solve and would tend to avoid problems versus solving them. At the same time, his Personal Control was not the highest score though it was low. This was somewhat of a contradiction as one might have expected all three scores to be low or all three scores to be high. These scores were in the upper range for both Problem Solving Confidence (possible range 11-66) and Approach-Avoidance Style (possible range 16-96). It may be that his way or style of problem solving may be linked to the amount of control he perceives he has when problem solving. As the Confidence score of the other two instructors indicate a slightly higher trust in their ability to problem solve, their Approach-Avoidance scores indicates that they are more likely to approach problems when problem solving.

Technology Integration

The Technology Integration instrument consists of 20 items using a 4-point Likert scale. The instrument is based on the underlying principle that there are at least five stages for integrating technology in education: familiarization, utilization, integration, reorientation, and evolution. There were two data collections points: at the beginning of the semester; and at the end of the semester (see Table 3). These data were considered with each individual case study.

To determine any overall changes in the level of technology integration, the following six paired t-tests were conducted for each stage: pre and post-semester scores (see Table 4). Although the sample size was extremely small, it is interesting to note that except for the Reorientation stage, there were increasing trends at the other four levels. This may be because even though the instructors were using the technology with their classes, this utilization did not

necessarily change their instructional methods yet. They have been able to see where the technology might benefit other classes but were unsure as to how they needed to fully integrate it with their style of instruction to better use the technology. There was a significant difference at the Utilization level which might be attributed to the group overall as it was the first time that any of the teachers had actually integrated web page technology with their classes.

Table 3

Pre and Post Technology Integration Scores

Instructor	Technology Integration Level	Familiarization	Utilization	Integration	Reorientation	Evolution
Taylor	**Pre**	8	6	4	6	4
	Post	11	9	6	8	6
Winter	**Pre**	6	2	4	7	4
	Post	7	5	5	6	4
Allen	**Pre**	5	5	3	10	2
	Post	11	9	6	8	6

To determine whether the teacher's appraisal of his or her ability to problem solve had an effect on the level of technology integration, individual teacher scores were reviewed with respect to the utilization scores that reflected a significant difference (see Table 5).

Table 4

Paired t-Tests

Technology Integration Level	Mean Difference	*t-Value*[*]	*p*[*]
Familiarization	-3.3333	-2.2941	.1487
Utilization	-3.3333	-10	.0099*s*
Integration	-2.0000	-3.4641	.0742
Reorientation	.3333	.2773	.8075
Evolution	-2	-1.7320	.2254

[*]t-Value > 4.303 and p <.05 to be significant *s* denotes a significant value

Table 5

Total PSI Scores and Utilization Scores for Technology Integration

Instructor	Total PSI Score	Pre	Post
Taylor	96	6	9
Winter	83	2	5
Allen	65	5	9

In looking at the individual teacher's appraisal of his or her problem solving (see Table 5), the instructor, Taylor, who had the highest total PSI score, showed an increase of three points in the utilization stage of technology integration from pre-semester to the post-semester score. Winter, whose PSI scores fell in the mid-range, also had an increase of three points where Allen,

who had the lowest PSI score, had the greatest gain at the utilization level of four points. This is very interesting when these gains are compared to the individual Personal Control scores (See Table 6).

Table 6

Individual Personal Control Scores and Gains in Integration Score for Technology Integration

Instructor	Personal Control	Gain in Integration Score
Taylor	15	2
Winter	20	1
Allen	10	3

It appears from the data there may be a correlation between the amount of Personal Control an instructor feels he or she has over their emotions and actions when problem solving and the degree to which an instructor will utilize Internet technology in their instruction (see Table 6). Winter and Taylor, who had equal gains at the Utilization level also had the highest Personal Control scores, indicating that they felt they has the least amount of control over their emotions and actions when problem solving in this sample. Allen, who had the greatest gain at the Utilization level, also had the lowest Personal Control score, indicating that she felt she has control over her emotions and actions when problem solving.

It should be pointed out at this point, that the Personal Control scale can also be defined as the amount of perceived control one has over his or her environment when problem solving. In the case of these instructors, each was problem solving when trying to integrate the Internet technology into his or her instruction. Thus Personal Control can be described as the amount of

control an instructor feels he or she has over the classroom environment (i.e. the Internet) or content (i.e. web pages) to be able to integrate the technology effectively. A higher Personal Control score in this light might indicate that the individual does not feel as though he or she has control over his or her environment and content when integrating Internet technology with his or her instruction.

Individual Case Studies

Taylor

First Impressions. Taylor's office is located in the history department on the third floor of one of the older more majestic buildings in the older main campus of the university. Unlike the other two instructors, his office is a spacious office with two big windows that are moderately cluttered with Egyptian and Middle Eastern paraphernalia, books, awards, citations, and papers. A secretary sits just outside of his office. He has a well-stocked bookcase. A new computer sits on a separate stand to the right of his desk. There was always a line of students coming in and out of his office.

Dr. Taylor views himself as a storyteller who reveals the epic of history. During his interviews, he expressed that he felt he was a maverick with the use of technology, a forerunner in his department. He had been actively doing things with technology by mastering PowerPoint for use with his classes.

Taylor's total PSI score was the highest for all three instructors (see Table 5). While his score for the Personal Control scale was the medium score, his scores in both the Confidence and Approach-Avoidance scales were the highest (see Table 8). This suggested that of the three instructors, Taylor had the least amount of trust in his abilities to problem solve and that he may or may not approach problems when problem solving.

Table 7

Technology Integration Scores for Taylor

Technology Integration Level	Familiarization	Utilization	Integration	Reorientation	Evolution
Pre	8	6	4	6	4
Post	11	9	6	8	6

Table 8

PSI Scores for Taylor

Scale (Range)	Confidence (11 - 66)	Approach-Avoidance (16 - 96)	Personal Control (5 - 30)
Taylor	36	45	15

Technology Integration Level. Taylor showed strong gains at both the familiarization and utilization levels with smaller gains consistent at each of the higher levels suggesting he was at the utilization level (see Table 7). This is somewhat supported by the qualitative data gathered from the interviews. Taylor does have some background with technology in that he was utilizing PowerPoint for some time with his classes. He believed that he was "fairly efficient" in using PowerPoint and that he had "learned to use computer projectors and to use the computer in the classroom." However, since in all his descriptions, he is the one primarily using the technology and his instruction is not dependent on using the technology; this places him at the utilization level of technology integration. He explained that he was a "little uncomfortable" about using the "internet in the classroom" citing his use of the technology and not his students. He felt he

was a “babe in the woods in terms of classroom use” where he was not much farther along than his own “private use.” There was also very little email exchange with Dr. Taylor which might suggest a link between his “private use” of technology having an affect on his technology integration level in the classroom.

While working with the cooked notes, three themes emerged that suggested a relationship between his appraisal of his ability to problem solve and the level at which he integrated Internet technology. These themes focused on how his role as instructor, his technology integration level and web page use, and how he resolves technology problems. Each of these themes and his level of technology integration appeared to be directly related to his Personal Control score (see Table 7).

The Role of the Instructor. Dr. Taylor initially described his role of instructor as a “professional guru” and “professional storyteller” where he was the provider of information. He believed that it was very important for him “to provide materials”, whether written or images. When it came to using Internet sites in his classroom, it was up to him to “determine what the quality ones” that were there. He tried to make “history come alive” by providing his students with “examples from the past and possible personal experiences” from his travels. He saw himself as the main, if not the sole provider of all information in his classroom.

This suggests that for instruction to take place in his classroom, he needs to have control over not only the classroom environment but also the content that is being taught. While his Personal Control is not high (see Table 8) as it fell below the mean for that scale’s range, it could suggest that his feelings that he was in control of his actions and emotions is due to his control over the content and instructional environment. This would occur if one considered the act of teaching as a problem to be solved. His Confidence score was the highest for the group

indicating that he had the least amount of confidence in his own ability to problem solve. During his second interview he said that he was "allowing students to use Internet articles as long as they [could] convince [him] that they [were] scholarly." The information on the virtual environment of the Internet is not within his personal control and his way of resolving a low level of confidence in his ability to problem solve or to find the same information as his students may be the reason he expressed the need to make sure that all the information is "accurate and correct." He pointed to the fact that students are not "aware that not every site on the Internet is acceptable for scholar use or is produced by a scholar."

When asked if he would be open to including an Internet based assignment for his students, he felt that it would be "overwhelming" for him at that point. He did remark that if "someone were to educate" him and it "proved to be beneficial", it might be something he would be willing to do. He pointed to the fact that he offered to let students cite online resources if they would include a "hardcopy" of the article so he could "read it." However, to utilize possible museum sites, he paused and pointed out that his instruction "could be enhanced by visiting a real museum let alone one on the Internet." This supported his role as an instructor as directly related to the amount of control he has over his classroom environment and content.

He believed his instruction had changed in that he "did actually use the Internet in the classroom" and "showed them other sites when questions" came up during class. He was still in control of the information though in that he was in control of the computer and what was being presented to the class as a whole. It is interesting to note that Taylor sees any future change in his instruction as a result of using technology more as an extension of his current teaching practices. He planned to include the use of an online text in which he would include reading assignments in his syllabus and a "study guide" that would tell his students exactly what material

they were to study. He plans to tell "them where the on-line textbook" is in order "to make sure that they actually do use it" and in that way there "will be quite a change" in his instruction. Again he is in control of the information in that the on-line textbook does provide him a certain amount of control of the information. While Taylor does see himself as a "storyteller", this could explain how his role as instructor is more of a provider and controller of information.

The Use of Instructional Web Pages. Besides having his syllabus and "images, the slides, and the maps and things that" he regularly shows his class at his web site, Taylor was quick to add that he would "like to include certain articles" that he had published for an "extra credit" assignment. He also wanted to provide his students with links to "some of the quality web pages" that he was aware of though he did not necessarily want to require Internet based assignments. While Taylor's use of web pages with his class seemed to be limited by the amount of control he felt he had over the information, he appeared to be utilizing his web pages to support his instruction rather than to supplement his instruction. This supports his use at the utilization stage of technology integration as long as he was in control over the information.

The web site served more to archive materials he regularly used in his classroom. He was pleased that he was able to "share the materials that [were] used in class" where his students could "get to them at their own convenience and not require [him] to give up class time." He felt he had used the web site as he had intended which was to be "available for their study if they want to reinforce" what was taught in class." Control over the virtual environment was very important to Taylor as in one conversation, he said that he did not want his students to access the site until the PowerPoint presentations were up and he had had the opportunity to view them. Though several offers were made to develop special topic pages for him, Taylor insisted on using images and information already available at other web pages he had located. Resource links

added to the site were only those he provided as he felt he needed to "tell them to look for specific primary sources." This supports his need to be in control of the virtual environment and the information that his students would see. Another reason Taylor may have limited his use of the web pages to a supportive role may have been due to the fact that he was concerned that students would utilize it more than the traditional classroom. He expressed a concern that the web pages might present a way for students to "stay and home and watch" class from there and "miss class altogether."

Resolving Technology Problems. While there was an initial problem with hard drive space on the university's server, the larger problem in Taylor's mind dealt with copyright issues and his control over the virtual environment. Because both his web page designer and server were outside of the history department, Taylor felt the need to set up a second or "temporary substitute" for "those who could not reach" the original site. Even though the initial difficulty only lasted the first two weeks of school, Taylor seemed to continue to experience difficulty using the web page and could not access the site from his computer at home. His few e-mail messages focused on technical difficulties he was having which seemed to be due more to the older browser he was using than actually accessing the web site.

This is interesting when considering his scores in both the Confidence scale and the Approach-Avoid scale. While both these scores were not exceptionally high, neither were these scores low. This indicates that he has a moderate level of trust in his own ability to problem solve and could go in either direction when problem solving, either approach the problem or avoid the problem. When the initial problem rose with his web site, he solved his problem by simply avoiding the web site and having a second site created for his use within his own department. This also helped solve a secondary problem where the original site was outside of

his control on a main university server and the second site was located within his reach in his own department.

Another concern Taylor had with creating and using a web page with his class dealt with copyright issues. Many of the images he had been using with his PowerPoint presentations were not his own and while he felt comfortable with using them in his own classroom as a PowerPoint presentation, he was all too aware of their availability on the Internet if they would be posted. "A lot of what I am doing is copyright stuff" he said during his first interview as he expressed his reasons for wanting his web site "password protected so not everyone could get" access to it. In this way, the site "would be limited to classroom instruction" and at the same time, provide him with control over the virtual environment. However, even when the site was placed in a secure environment on the university server, he still preferred to have it on the department server where it was still "password protected." In this way, he was able to approach the problem, solve it, and avoid the original web site.

Winter

First Impressions. Dr. Winter's office is located on the fourth floor in the language department of an older building. One has to take the freight elevator or climb the stairs to get to the interior office that she shares with another professor. Her office is built much like a bomb shelter with no windows and a small sign on the door that reads "Alice Winter – Latin". On the walls are a few pictures and in the back corner is a small bookcase with a modest collection, mostly Latin and large museum books. Her desk is a little disorganized with small piles of papers and a nearby phone that is shared by both professors. Although Winter does not have her own computer, the other professor in her office does have an older one sitting on that desk.

Dr. Winter was educated in England and speaks with a soft British accent. From her interview, there was an increasing excitement about the potential use of the Internet with her class though this was sometimes frustrated by the lack of technology available for her use in her office. Winter's overall TI score appears to be at the utilization level where she had her greatest gain although she did score higher at the reorientation, she also experienced a decrease from pre to post semester. Her scores at the familiarization level were also higher but her overall increase at that level was less than at the utilization level.

Winter's total PSI score fell in the mid range for the sample (see Table 5). Her Personal Control score was the highest while her Confidence score was tied for the lowest in the group and her Approach-Avoidance score was in the medium range (see Table 10). This suggested that while she had confidence in her ability to problem solve and would be more likely to approach a problem, she felt that she did not have as much control over her emotions and actions when problem solving.

Technology Integration Level

While Winter had higher scores at the other levels of technology integration, her greatest gain was at the Utilization level (see Table 9). At this level, she demonstrated a three point gain where at all other levels, the most gain was only one point. Her interviews also seemed to support an overall score at the Utilization level as well. In her very first interview, she said she would use more technology but first she would "need to learn a bit more about it", indicating a familiarization level. By the second interview, it was clear that she was moving to the utilization level. She expressed an interest to "try and do this with [her] mythology class" in the future. Her last interview points to more discernment on her part in utilizing using technology when she said she thought that "some of the sites were better than others" for use with her classes. Her email

also supports a Utilization level of technology where she asked to have certain changes made to "draw their attention to the maps on pages 18 and 28" in their texts. This strongly suggests Utilization level in that the technology is not necessary for instruction to occur because the maps were in the text.

Table 9

Technology Integration Scores for Winter

Technology Integration Level	Familiarization	Utilization	Integration	Reorientation	Evolution
Pre	6	2	4	7	4
Post	7	5	5	6	4

While working with the cooked notes from our interviews, there were three definite themes dealing with how Winter integrates technology and why: her role as an instructor, the use of instructional web pages, and problems when using technology. It would appear that her ability to integrate technology is more dependent on the availability of the technology in each of these areas than her ability to use the technology.

Table 10

PSI Scores for Winter

Scale (Range)	Confidence (11 - 66)	Approach-Avoidance (16 - 96)	Personal Control (5 - 30)
Winter	24	39	20

The Role of the Instructor. Initially, Winter viewed herself as an "interpreter" or "guide" where she directs "the students to make use of the facilities" in order to get as much out of the class as possible. She felt that while she hoped most "students will find out things for themselves", Winter still needed to go over the material during class to "make sure that they had gotten" the most out of it. This would support her Personal Control score (see Table 10), which was the highest, in that while she wanted her students to "find out things for themselves," she still felt the need to cover the material in class to "make sure." This might suggest that she had a perceived need to be in control of the material during instruction when the instruction was part of the problem solving process and she was solving the problem for her students.

It is interesting to note that Winter also expressed a desire for her students to seek out new information on the Internet and to bring it back to the class to share. When asked what she thought she would have to change in instruction to make better use of the web pages, she responded that she could "send them to find out more and bring it back to share what they find." She also expressed a degree of frustration revealing that this may have been her hope from the beginning when she said that she wanted students to "find out things for themselves" and at the second interview when she commented that though some of her students were doing this, it was "not the majority."

This frustration was further compounded one time when she "referred them to look up the Parnassus" and only a few of her students did. Winter questioned whether this might be because she did not make it a "mandatory" assignment. If Winter was to require Internet assignments, this would place her more at the integration level but as the web pages are not necessary for her instruction, this would make her still at the utilization level. Remembering that the Personal Control scale measures how much one feels one is in control of his or her actions or emotions

when problem solving, she may have also avoided making assignments "mandatory" to avoid feelings of regret later.

The Use of Instructional Web Pages. Winter's actual use of the web pages also supported her at the utilization level. While she views them more than just an archive, the web pages were seen as supplemental to her instruction and not essential. Winter described her using of the web pages as "a place where they could go for information" that her students could "see a lot more than they *could* visualize in their mind's eye." When asked whether she would require her students in the future to go through the online virtual tours, she simply responded "yes". Her openness to these sites in contrast to her reluctance to expound further on it may be due her Personal Control score. Toward the end of this interview, Winter did comment that she knew of one virtual tour, "the House of Livia in Rome" which she would like to use. Here she was already familiar with the site, which would give her a sense of personal control over her actions if she were to require the web page as part of an assignment.

Winter did, however, draw a line between using instructional web pages as supplemental or to supplant instruction when she said that she did not "quite see *herself* doing on-line discussions but supplementing information." This was interesting as on-line discussions are activities usually found at the reorientation level and that was the one level where she had a decrease from pre to post semester. This could point to a need for her to be in control of the instructional environment. If she were online with her students in a virtual classroom, she would not have the same amount of perceived control as in a traditional classroom. It should be pointed out that there was a high level of trust between her and the individual who was developing the web site in that she would ask him to research the Internet for specific sites. In an email, she asked if he "might be able to find an Etruscan site or something on the historian Livy." Again

this demonstrated that to Winter, the most important use of an instructional web site was to visually supplement her instruction. She said that she liked web sites with "clear pictures" and did not foresee her students "actually doing exercises but more for gaining more information". The gaining of new information is typical of supplemental web pages where supportive web pages only act as an archive for information that is traditional given in class.

Problems When Using Technology. Initially, at the beginning of the semester, there were some minor problems with getting the web sites up and running. The University server had to install more hard drive space to maintain web pages and online courses so there was a two-week delay. The web pages were then transferred to another server with a different address. Winter expressed in an email that she was "frustrated because so far [I] have not been able to locate it." The fact that she was trying to locate the web page is supported by her PSI Approach-Avoidance Score which suggests that she would be more likely to approach a problem instead of avoiding it (see Table 7). Winter had to share a computer with an "office mate" and had to arrange her meeting times with her web page designer around computer availability. She approached this problem by rearranging her schedule to use the computer. In one email she suggested a later time because her "office mate [would] probably be using her" computer at the earlier time.

Another interesting point when dealing with problems using technology was her reaction to her students experiencing problems. When her students expressed concerns over accessing the web pages because they did not "have a computer", she felt that was not a reasonable excuse as "they have plenty of places to go." It appeared that she expected her students to also approach problems instead of avoiding them. One student was frustrated in trying to find some extra information for extra credit. Winter knew that "he could have gone to the library but [she]

directed him to the website."

Allen

First Impressions. Dr. Allen's office is located on the second floor of a building that was once the gymnasium and now houses the English and Philosophy departments along with the campus ROTC program. Her department, Humanities, is a sub group of the Philosophy department. A ride up in the elevator and a quick walk down the hall, leads one to a small office door tagged Humanities. The office, which has no windows, is similar to a closet and is divided into two cubicles to house two professors. The computer, an old PC, is located immediately as one enters into the office on a table by the door. Along with her neat orderly desk, she has a well stocked bookcase of classical Greek and humanities books.

Originally from England, one immediately notices Dr. Allen's accent. A small, older woman, Allen was very thoughtful in all her responses. Allen's overall TI score appears to be at the familiarization level where she had her highest score and a 6-point gain (see Table 11). Though she did gain the 6-points at the evolution level, her score there was the lowest. Allen also showed a 4-point gain at the utilization level, with the utilization level being her second highest post score. It is also interesting to note that she experienced a decrease from pre to post semester at the reorientation level.

Of all three instructors, Allen's total PSI score was the lowest overall (see Table 5). While her Confidence score was tied for the lowest in the group, both her Approach-Avoidance and Personal Control scores were the lowest by several points. This suggested that she had confidence in her ability to problem solve and would be most likely to approach a problem instead of avoiding it. Her low score in the Personal Control scale suggested that she felt she was in control of her emotions and actions when problem solving.

Table 11

Technology Integration Scores for Allen

Technology Integration Level	Familiarization	Utilization	Integration	Reorientation	Evolution
Pre	5	5	3	10	2
Post	11	9	6	8	6

Table 12

PSI Scores for Allen

Scale (Range)	Confidence (11 - 66)	Approach-Avoidance (16 - 96)	Personal Control (5 - 30)
Allen	24	31	10

Technology Integration Level. Allen had her highest scores and greatest gain at the familiarization level of technology integration (see Table 11). Her second highest score was at the utilization level with a 4-point gain. However her interviews seem to support an overall score more at the Utilization level though there is data that reflects her moving from the familiarization level to the utilization level during the semester. In her very first interview, she said that she did not "know enough about the technology" to know exactly how she wanted to use her web pages. She cited her "inexperience" and her not knowing "how to do it" as reasons why she was unsure how she would use the Internet with her instruction.

It was interesting to note that in spite of her lack of familiarization with the technology, Allen made statements in her first interview that suggested other levels of technology integration.

She expressed a need to include Internet activities "as a requirement" which pointed to the integration level. She almost expressed a desire to ask her students "to evaluate [the web pages] at the end of the semester" in order to "get some feedback from" her students as to whether the web page would be "a useful thing to do." If the students found the web page useful then she would "think up some other ways of incorporating it into a larger class." These statements were more reflective of the integration and reorientation levels.

In her later interviews, she also said that she used her web page "not as an integral part of the instruction but as an extra resource" and that the links her designer had found for her were "just wonderful to use." She spoke of how she would "tell them to go on and look at certain things" on the web page that deal with the subject matter she was covering at that time. Allen also gave her students assignments where they would do a "critique on one of the resource sites." All these statements place her at either a high utilization level or a low integration level because of the required assignments. In her email, she also cited the "tour of Mycenae" as some of the "visual" effects she wanted for her students to experience. Virtual tours are also suggestive of the integration level.

After categorizing the cooked notes, two themes emerged suggesting a relationship between her appraisal of her ability to problem solve and how she integrated Internet technology. These themes centered on (1.) the role of the instructor and, (2.) integrating technology and problem solving. There also appeared to be a relationship between these themes and her Approach-Avoidance scale score (see Table 12).

The Role of the Instructor. In the first interview, Dr. Allen described herself as a teacher but said that she also saw her role "not so much as somebody who has information [that] has to be drilled in but as somebody with the resources." She believes that "you can't teach

anybody anything" but rather she could "only help them learn" and that her main role was "to generate an atmosphere in the classroom." The way "to encourage" her students was to "build enthusiasm" in herself by taking a "very positive attitude and assume they are all going to" learn. Dr. Allen had a very low Personal Control score indicating that she felt she was in control of her emotions and actions when she problem solved. This self-appraisal may be the reason she sees her role as more of a motivator by controlling her own emotions and actions.

Interesting in her description was that she did not see herself as one in control of the information but rather in control of her attitudes and emotions and the attitudes she generated in her students as a teacher. Finding a "way of focusing" her students on "the important" information was part of her role as instructor but she saw it more as helping her students to "sort out what the important ideas" are. She was also concerned with teaching her students good study habits like how to take notes. Along with her low Personal Control score, Dr. Allen's Confidence was also low, indicating that she had confidence in her own ability to problem solve which may be the reason she did not feel the need to control the information. She had confidence in her own abilities to focus her students on the correct information did not feel the need to actually control the flow of information. She wanted to find ways "of getting them to look at more things" though she did "like to go and check just to see what they [were] getting." She had no problem with her students locating sites or going beyond her web site. When she was discussing her students accessing the web site, she commented that "they found a lot more" than there was on the web site. The fact that "they went digging a bit farther" seemed to be encouraging to her.

The fact that she did not need to control the information was also seen in that Dr. Allen was very open to new sites presented to her by the researcher. In an email she asked the

researcher if he could locate additional sites such as something "on the background to Greek plays" that could be included at the web site. The researcher designed a special addition to her web site, a PowerPoint presentation on the Roman arch in which there was no real input from the instructor. Allen said that it was good as the timing was "appropriate" according to the syllabus and she was not concerned that she did not control the information. Because of her high confidence in her own abilities to problem solve, she was now more interested in how she could use this PowerPoint technology in her classroom. This speaks to her tendency to approach new problems rather than avoid them, as her Approach Avoidance score was the lowest for the group of instructors.

Integrating Technology and Problem Solving. As seen in her role as an instructor, Dr. Allen had confidence in her own ability to problem solve and was willing to approach new problems. In the interviews, Dr. Allen described her approach to integrating technology as a problem that she strived to solve in a very systematic way. During the interviews, there were two main problems she was concerned with, class size and time.

Because she was initially concerned with trying to integrate technology with some of her "classes that are over 50 students," her way to approach this problem was to begin with a "small group", her "honors class". She questioned "how practical" it was to try with a "very large class." She decided to begin with the smaller class "by way of an experiment" to try "to get some feedback" from that class first to see if it was worthwhile. Then providing the technology was worthwhile, she said she would then "think up some other ways of incorporating it into a larger class." This approach was reflective of how she problem solves as well as a possible way for her to maintain control over her emotions and actions. She approached the problem of class size in a thoughtful systematic way with steps of how to resolve the problem and how to proceed

to the next step once successful with the first. As she explained how she arrived at her decisions, there was never anything negative said, but rather what she planed to do next provided all went well. This might point to her high confidence in her own ability to problem solve.

Allen also suggested that success might depend on her own ability to generate enthusiasm in her students to use the web page. She felt it would be easier by starting with the smaller class, because she felt this was important even though she was "reluctant to do" so herself after "many years of experience trying to motivate students in these big classes." In this way she may have been controlling her own emotions and actions in order to integrate the technology. Her approach to problem solving appeared to be linked with her personal control over her emotions. By approaching the problem in a systematic process where she had some degree of control over her own emotions and actions, she felt she could get the most out of using the web pages.

Part of this systematic approach included feedback from her students. In this way she could measure the expected success. She decided to require a small assignment based on her own personal experience. While she used the web site primarily as "an extra resource", she did asked her students to do "one critique" by choosing "one of the resource sites." Based on the positive response she received, she decided to have her students do a second critique on the "Roman things." Feedback was a very important step and was also demonstrative of her own confidence in that she was not concerned with the reaction she would get but rather she planned to use the feedback for future direction.

It was interesting to note that when Allen was asked about using an online chat group or web board, she hesitated. This agrees with her technology integration score at the Reorientation level where her scores actually decreased from pre to post by 2 points. Using an online chat session or a web board are activities at this level. When asked about possibly using a chat room,

her main concern was classroom size. "Numbers are what bother me here. How practical is that with a very large class?" she asked. She was already considering some of the difficulties she needed to deal with in order to be able to approach the problem in a systematic way.

Another minor area that Dr. Allen mentioned twice in her interviews dealt with time. In her first interview, she commented that an additional concern she had with using the web site with a large class dealt with time. She was concern that if she asked them "to do something, how much time" would she need to allow them to complete it. By the second interview even though time was still a concern of hers, she was already beginning to work out a solution. Because the web site "worked so easily" with the smaller class, she thought she "could certainly expand it to a larger group of students." By the third interview, she was already planning on using a web site with the larger class and now the question was how "to devise some ways of getting feedback from them to make sure that they were in fact using it."

Chapter 5

Discussion

Though the sample size for this study was extremely small, the results of this study seemed to indicate possible answers to the following research questions for this study: (1.) What influence does using a web-page designed to support and/or supplement a course have on these instructor's ability to integrate technology; and (2.) What relationship exists between these instructors' styles of problem solving have on his or her ability to integrate technology? An analysis of the individual case studies, led to the following finding and conclusions.

What influence does using a web-page designed to support and/or supplement a course have on these instructor's ability to integrate technology?

As part of the design of this study's design, the researcher worked with each instructor to develop a web site that could be used to support or supplement a course that the instructor was teaching. While none of these instructors had the knowledge to create a web site, the researcher made every attempt to meet with each instructor during the initial stages to make sure that each web site would meet the needs of that instructor. Initially, each web site was just a carbon copy of the instructor's syllabus with a little color in the background depending on that instructor's preference. When the researcher offered to research the Internet to find resources to be used with their instruction, all three instructors initially welcomed it.

Taylor, however, wanted to personally check out all resource links before they would be posted to his web site. He expressed a strong preference to have his own personal PowerPoint presentations posted with the understanding that the web site would be pass-worded to protect any copyright issues. While several possible resources were sent or given to Taylor personally, he never really gave his approval to have any of them included on his web site. Only one site

was actually approved for inclusion on his web site. His level of technology integration was at the Integration level and this was supported by his use of the web page, which was primarily for an archive of classroom information (see Table 13).

Winter and Allen both welcomed suggested Internet resource links, allowing the researcher to go ahead and include them immediately at the web site without prior approval. Both of these instructors also asked the researcher if he could help them find more topic specific resource links. Winter directed one student to research other possible resources for extra credit, while many of Allen's students brought in new resource links for the class. This is representative of the difference between the two levels of technology integration with Winter being at a high level of Utilization and Allen being at the Integration level (see Table 13).

Table 13

Web Site and Level of Technology Integration

Instructor	Web Page Use	Level of Technology Integration
Taylor	Support: Primarily as an archive for syllabus and material handed out in class	Utilization
Winter	Supplemental: Included resource links for student use though not required	Utilization*
Allen	Supplemental: Included resource links and required web site assignments	Integration

*This level is at the high end of this technology integration level.

What relationship exists between these instructors' styles of problem solving have on his or her ability to integrate technology?

The results of this study indicated a relationship between an instructor's style of problem solving and his or her ability to integrate technology. This may be due to the amount of confidence an instructor has in his or her problem solving ability and whether an instructor will approach or avoid a problem. Another possible reason may lie in whether an instructor would approach a problem or avoid a technology problem based on the amount of Personal Control an instructor felt one had over one's emotions and/or actions when problem solving.

When studying the scores for both the Confidence scale and the Approach Avoidance scale for all three instructors, it was clear to see a relationship between the total of these two scales and the level at which the instructor would integrate technology (see Table 14). Taylor's overall total PSI score along with both his Confidence and Approach-Avoidance scales were the highest for the group while his technology integration level was the lowest at the Utilization stage. Winter, whose total PSI score was in the mid range for the group and was also at the Utilization stage although this was at the high end of the Utilization stage for technology integration. Based on her interviews, when she described her role as an instructor, the use of the web site was not solely for herself but for her students, as she wanted them to "find out things for themselves." She included resource links at her web site that she wanted her students to go and see though she did not require her students to do this.

Allen's total for the same two scales was quite a bit lower and her level of technology integration was slightly higher at the Integration level. Of all three instructors, Allen had the highest confidence in her ability to problem solve and was the most likely of the three to approach a problem. This is also evident when it came to requiring assignments based on the

class web site. While the Confidence scores for Winter and Allen were the same, Allen's Approach-Avoidance score suggested that she was more willing to approach a problem than Winter. This was seen when it came to requiring students to use the web sites. While Winter was aware that requiring some type of assignment of her students might be needed, Allen went ahead and experimented by requiring her students to do critiques on the posted site resources.

Since both Confidence scores were the same for Winter and Allen, the difference was then in their Personal Control scores where Winter had the highest for the group and Allen had the lowest. The higher Personal Control score suggested that Winter did not feel she had as much control over her emotions and actions when problem solving. Her frustration over the "majority" of her students not visiting the web sites was evident of her higher Personal Control score. This frustration or feeling of not being in control may be the reason she avoid this problem by not requiring web site assignments of her students. Allen, on the other hand, had the lowest Personal Control score suggesting that she felt was in control of her feelings and actions when problem solving. This was evident as she wanted "feedback" from her students and saw that requiring some minor assignments such as the "critiques" as a way to get some feedback.

Table 14

Personal Control Scores and Technology Integration Level

Instructor	Confidence	Approach-Avoidance	Personal Control	Total	Technology Integration Level
Taylor	36	45	15	96	Utilization
Winter	24	39	20	83	Utilization*
Allen	24	31	10	65	Integration

*This level is at the high end.

Dr. Taylor had a medium score for his Personal Control indicating that he felt he was somewhat in control of his emotions and actions when problem solving. Throughout his interviews, he repeatedly expressed his concern for the quality of information his students might find on the Internet. He would only allow "students to use Internet articles as long as they [could] convince" him that the articles were scholarly. This placed all information found by his students on the Internet at his discretion or control as to whether it would be acceptable in his classroom. Even when asked about possible Internet assignments, he wanted to be first shown that any assignment would be "beneficial." Further, when offered reputable museum sites, he said that his instruction would be better "enhanced by visiting a real museum." Dr. Taylor's lower trust in his own ability to problem solve and being the most likely to avoid a technology problem of the three instructors, might be the reason he would avoid a virtual museum. When he first experienced difficulty with downloading the web pages, he immediately had a secondary site created by someone else in his department. He may have done this because he does not trust as much in his own ability to problem solve and in this way he was able to avoid any problems with the initial web site.

It should be pointed out that based on the instructors' responses during the interviews, there was evidence to suggest that an instructor's feelings of control over his or her emotions and behaviors was directly linked to the amount of control he or she felt they had in the classroom environment. The virtual environment offered by the Internet is outside the physical control of any instructor. All three instructors stopped at using the Internet for higher-level integration when they were asked if they would be interested in activities that were totally online such as a chat room or web board. The virtual classroom would not have the same amount of perceived control as in a traditional classroom. This is different from the original intent of the Personal

Control scale on the PSI where the Personal Control is more internal than external.

Conclusion and Implications

Research with the PSI has shown that individuals with overall low total PSI scores tend to be more successful with cognitive activities. Individuals who appraise their problem solving negatively or those with higher scores are more likely to be less effective in problem solving. The implications of this research paper are that instructors who appraised their problem solving positively are more likely to integrate technology at a higher level than those who appraise their problem solving negatively. In addition an instructor's self-appraisal of his or her ability to problem solve should be taken into consideration when planning to integrate web site technology.

Control of the instructional environment is very pertinent to today's pedagogy with so much being discussed about online instruction. The higher levels of integration of Internet technology include seemingly endless sources of information and the virtual classroom. In essence, both of these are beyond the reach of the traditional classroom instructor. Whether an instructor can make the move from traditional classroom to the virtual classroom might be impacted by one's self-appraisal of one's problem solving ability. The relationship between an instructor's appraisal of his or her problem solving style and technology has implications beyond just using a web site with a traditional classroom but who might be teaching in the virtual classroom of tomorrow.

The implications of this research may have an importance for future professional development sessions designed for instructors who want to integrate Internet technology in their instruction or want to design online classes. The research suggests that it may be of value to first assess the problem solving style of the instructors and then design the professional development

session. How such sessions are presented and followed up may determine the success of the participants. For example, mentoring and regular follow-up sessions may be necessary for instructors who have a low problem solving confidence and are likely to avoid problems. For instructors who feel they are not in control of their emotions and actions when problem solving, the emphasis should focus on the role of the instructor when integrating Internet technologies or using distance education. This points to the need for future research in these areas regarding how the design of instruction for instructors wishing to integrate Internet technology can be influenced by the problem solving style of the participants.

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